

**Addendum to USGS Columbia Environmental Research Center Final Report:
Radiochemical Analysis from Los Alamos National Laboratory Use Study
Phase II: Toxicity Testing of Surface Waters and Sediment Pore Waters**

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Radiochemical analysis was conducted on water and porewater samples that were evaluated for toxicity in 1996. Unfiltered water samples for radionuclide determination were collected at perennial reaches of Canon de Valle, Pajarito Canyon, Sandia Canyon, Los Alamos Canyon below Los Alamos Reservoir, and a reference site above Los Alamos Reservoir. In addition, a sample of laboratory-generated reverse osmosis water from the Columbia Environmental Research Center was analyzed as a laboratory blank. Porewater samples were collected at all sites except at Los Alamos Canyon below the reservoir; lack of sediments at this site did not allow for porewater extraction. All samples were analyzed within 6 months of collection.

Each sample was analyzed for gross alpha and beta emissions, thorium (227, 228, 230, 232), uranium (234, 235, 238), barium 140, cobalt 60, cesium 137, iodine 131, potassium 40, and radium (226, 228). Activity is reported as PCI/L with 2-sigma uncertainty, and a sample-specific estimate of minimum detection limit (Table 1). For radionuclides measured by gamma spectroscopy, activity and 2-sigma uncertainty are reported only if the nuclide was detected. Radiochemical analysis requires the subtraction of an instrument background measurement from a gross sample measurement. Both values are positive, but when the sample acitivity is low, random variations in the two measurements can cause the gross value to be less than the background, resulting in a measured activity less than zero. Although this value has no physical significance, it may be statistically useful in evaluating long-term trends or comparing groups of samples. Therefore, results are reported exactly as they were generated, and values are not interpreted with "less than" notation.

Although positive and negative values are reported for all samples, measured concentrations of most radiochemicals were below the minimum limit of detection. Values for gross alpha and beta radiation were consistently below detection limits for all samples. Barium, cobalt, cesium, iodine, potassium, and radium were never detected. Uranium and thorium were measured at the detection limit or slightly elevated in occasional water samples and pore waters. Thorium 232 was measured at just above the detection limit in only one of the three water samples from Site 1 above Los Alamos Reservoir and thorium 227and 262 slightly exceeded detection limits in samples from Sandia Canyon. Uranium 234 most frequently exceeded detection limits, but then values were only slightly elevated. Of those chemicals with values exceeding detection limits, concentrations in water samples were similar among locations. Concentrations in pore water samples did not differ from levels in associated water samples. In addition, no relationship was demonstrated between concentrations of any of these chemicals and mortality observed in tests with *Ceriodaphnia dubia* in the Canon de Valle water.

Table 1. Radiochemical activity of gross alpha, beta, and gamma emissions from all water and porewater samples collected during August 1996 for toxicity testing. All values generated during analysis are reported. Values that exceeded the minimum limit of detection are boldfaced.

	Activity	$\pm 2\sigma$ Uncertainty	Detection Limit	Unit	Date	
					collected	analyzed
Gross Alpha	-3.18e+00	2.0e+01	5.5e+01	PCI/L	13VIII96	07I97
Gross Beta	5.76e+00	4.1e+01	6.2e+01	PCI/L	13VIII96	07I97
Th 227	1.22e-02	3.1e-02	4.3e-01	PCI/L	13VIII96	07I97
Th 228	- 6.25e-03	2.1e-02	2.3e-01	PCI/L	13VIII96	07I97
Th 230	1.59-e-02	2.0e-02	4.1e-01	PCI/L	13VIII96	07I97
Th 232	2.62e-02	3.0e-02	2.6e-02	PCI/L	13VIII96	07I97
U 234	3.18e-02	2.4e-02	2.5e-02	PCI/L	13VIII96	07I97
U 235	-1.89e-03	1.4e-02	3.2e-02	PCI/L	13VIII96	07I97
U 238	3.27e-02	3.1e-02	3.2e-02	PCI/L	13VIII96	07I97
Ba 140	ND		3.8e+02	PCI/L	13VIII96	07I97
Co 60	ND		9.5e+00	PCI/L	13VIII96	07I97
Cs 137	ND		7.2e+01	PCI/L	13VIII96	07I97
I 131	ND		5.5e+04	PCI/L	13VIII96	07I97
K 40	ND		9.8e+01	PCI/L	13VIII96	07I97
Ra 226	ND		1.0e+02	PCI/L	13VIII96	07I97
Ra 228	ND		2.7e+01	PCI/L	13VIII96	07I97

Los Alamos - Site 1
above Los Alamos Reservoir
Matrix: water
16 August 1996

	Activity	$\pm 2\sigma$ Uncertainty	Detection Limit	Unit	Date	
					collected	analyzed
Gross Alpha	2.18e+00	2.3e+01	5.3e+01	PCI/L	16VIII96	07I97
Gross Beta	3.52e+00	3.4e+01	4.1e+01	PCI/L	16VIII96	07I97
Th 227	2.22e-02	2.1e-02	3.7e-01	PCI/L	16VIII96	07I97
Th 228	3.17e-03	2.4e-02	4.3e-01	PCI/L	16VIII96	07I97
Th 230	1.95-e-02	2.0e-02	2.9e-01	PCI/L	16VIII96	07I97
Th 232	2.72e-02	2.7e-02	3.1e-02	PCI/L	16VIII96	07I97
U 234	4.01e-02	2.7e-02	2.8e-02	PCI/L	16VIII96	07I97
U 235	1.99e-03	2.4e-02	3.1e-02	PCI/L	16VIII96	07I97
U 238	3.72e-02	2.2e-02	4.0e-02	PCI/L	16VIII96	07I97
Ba 140	ND		2.6e+02	PCI/L	16VIII96	07I97
Co 60	ND		7.5e+01	PCI/L	16VIII96	07I97
Cs 137	ND		7.7e+01	PCI/L	16VIII96	07I97
I 131	ND		6.2e+04	PCI/L	16VIII96	07I97
K 40	ND		7.0e+01	PCI/L	16VIII96	07I97
Ra 226	ND		1.0e+02	PCI/L	16VIII96	07I97
Ra 228	ND		2.3e+01	PCI/L	16VIII96	07I97

Los Alamos - Site 1
above Los Alamos Reservoir
Matrix: water
19 August 1996

	Activity	$\pm 2\sigma$ Uncertainty	Detection Limit	Unit	Date	
					collected	analyzed
Gross Alpha	-4.33e+00	2.1e+01	5.4e+01	PCI/L	19VIII96	07I97
Gross Beta	5.27e+00	3.3e+01	4.9e+01	PCI/L	19VIII96	07I97
Th 227	1.54e-02	3.1e-02	3.9e-01	PCI/L	19VIII96	07I97
Th 228	4.22e-03	3.7e-02	3.5e-01	PCI/L	19VIII96	07I97
Th 230	2.57e-02	2.9e-02	2.7e-01	PCI/L	19VIII96	07I97
Th 232	-1.64e-02	2.9e-02	2.9e-02	PCI/L	19VIII96	07I97
U 234	3.44e-02	2.7e-02	3.6e-02	PCI/L	19VIII96	07I97
U 235	3.65e-03	2.3e-02	2.3e-02	PCI/L	19VIII96	07I97
U 238	2.79e-02	3.0e-02	4.3e-02	PCI/L	19VIII96	07I97
Ba 140	ND		3.0e+02	PCI/L	19VIII96	07I97
Co 60	ND		4.8e+01	PCI/L	19VIII96	07I97
Cs 197	ND		4.7e+01	PCI/L	19VIII96	07I97
I 191	ND		3.7e+04	PCI/L	19VIII96	07I97
K 40	ND		5.2e+01	PCI/L	19VIII96	07I97
Ra 226	ND		7.9e+01	PCI/L	19VIII96	07I97
Ra 228	ND		1.9e+01	PCI/L	19VIII96	07I97

Los Alamos - Site 1
above Los Alamos Reservoir
Matrix: pore water
21 August 1996

	Activity	±2σ Uncertainty	Detection Limit	Unit	Date	
					collected	analyzed
Gross Alpha	-2.58e+00	2.0e+01	5.2e+01	PCI/L	21VIII96	08I97
Gross Beta	1.56e+00	3.9e+01	6.7e+01	PCI/L	21VIII96	08I97
Th 227	- 1.87e-02	3.6e-02	3.7e-01	PCI/L	21VIII96	08I97
Th 228	3.70e-03	2.7e-02	3.4e-01	PCI/L	21VIII96	08I97
Th 230	2.31-e-02	2.3e-02	3.5e-01	PCI/L	21VIII96	08I97
Th 232	1.97e-02	2.3e-02	2.6e-02	PCI/L	21VIII96	08I97
U 234	4.21e-02	2.7e-02	3.3e-02	PCI/L	21VIII96	08I97
U 235	-1.93e-03	2.2e-02	2.4e-02	PCI/L	21VIII96	08I97
U 238	3.76e-02	3.2e-02	3.5e-02	PCI/L	21VIII96	08I97
Ba 140	ND		3.1e+02	PCI/L	21VIII96	08I97
Co 60	ND		5.7e+01	PCI/L	21VIII96	08I97
Cs 217	ND		4.8e+01	PCI/L	21VIII96	08I97
I 211	ND		4.6e+04	PCI/L	21VIII96	08I97
K 40	ND		5.4e+1	PCI/L	21VIII96	08I97
Ra 226	ND		1.0e+02	PCI/L	21VIII96	08I97
Ra 228	ND		1.6e+01	PCI/L	21VIII96	08I97

Los Alamos - Site 2
below Los Alamos Reservoir
Matrix: water
13 August 1996

	Activity	$\pm 2\sigma$ Uncertainty	Detection Limit	Unit	Date	
					collected	analyzed
Gross Alpha	8.32e+00	3.3e+01	6.0e+01	PCI/L	13VIII96	07I97
Gross Beta	4.32e+00	3.1e+01	7.2e+01	PCI/L	13VIII96	07I97
Th 227	2.48e-02	3.9e-02	3.5e-01	PCI/L	13VIII96	07I97
Th 228	3.69e-03	2.6e-02	3.4e-01	PCI/L	13VIII96	07I97
Th 230	1.98-e-02	2.3e-02	3.7e-01	PCI/L	13VIII96	07I97
Th 232	3.45e-02	2.7e-02	2.4e-02	PCI/L	13VIII96	07I97
U 234	3.62e-02	2.6e-02	3.4e-02	PCI/L	13VIII96	07I97
U 235	2.34e-03	2.1e-02	2.7e-02	PCI/L	13VIII96	07I97
U 238	3.07e-02	2.5e-02	3.2e-02	PCI/L	13VIII96	07I97
Ba 140	ND		4.9e+03	PCI/L	13VIII96	07I97
Co 60	ND		2.1e+01	PCI/L	13VIII96	07I97
Cs 137	ND		1.9e+01	PCI/L	13VIII96	07I97
I 131	ND		1.5e+04	PCI/L	13VIII96	07I97
K 40	ND		1.5e+02	PCI/L	13VIII96	07I97
Ra 226	ND		2.2e+02	PCI/L	13VIII96	07I97
Ra 228	ND		2.6e+01	PCI/L	13VIII96	07I97

Los Alamos - Site 2
below Los Alamos Reservoir
Matrix: water
16 August 1996

	Activity	$\pm 2\sigma$ Uncertainty	Detection Limit	Unit	Date	
					collected	analyzed
Los Alamos 2						
Gross Alpha	1.21e+01	2.9e+01	5.4e+01	PCI/L	16VIII96	07I97
Gross Beta	2.35e+00	3.6e+01	5.6e+01	PCI/L	16VIII96	07I97
Th 227	3.15e-02	3.7e-02	3.1e-01	PCI/L	16VIII96	07I97
Th 228	3.54e-03	2.9e-02	3.3e-01	PCI/L	16VIII96	07I97
Th 230	2.13e-02	2.6e-02	3.3e-01	PCI/L	16VIII96	07I97
Th 232	2.64e-02	2.6e-02	2.8e-02	PCI/L	16VIII96	07I97
U 234	3.42e-02	2.7e-02	3.1e-02	PCI/L	16VIII96	07I97
U 235	2.08e-03	1.7e-02	2.4e-02	PCI/L	16VIII96	07I97
U 238	3.27e-02	2.5e-02	3.6e-02	PCI/L	16VIII96	07I97
Ba 140	ND		5.8e+03	PCI/L	16VIII96	07I97
Co 60	ND		1.8e+01	PCI/L	16VIII96	07I97
Cs 167	ND		1.5e+01	PCI/L	16VIII96	07I97
I 161	ND		1.7e+04	PCI/L	16VIII96	07I97
K 40	ND		1.5e+02	PCI/L	16VIII96	07I97
Ra 226	ND		2.6e+02	PCI/L	16VIII96	07I97
Ra 228	ND		4.0e+01	PCI/L	16VIII96	07I97

Los Alamos - Site 2
below Los Alamos Reservoir
Matrix: water
19 August 1996

	Activity	$\pm 2\sigma$ Uncertainty	Detection Limit	Unit	Date	
					collected	analyzed
	Gross Alpha	3.02e+00	2.4e+01	5.2e+01	PCI/L	19VIII96 07I97
	Gross Beta	1.59e+01	3.2e+01	6.2e+01	PCI/L	19VIII96 07I97
	Th 227	2.76e-02	3.5e-02	3.4e-01	PCI/L	19VIII96 07I97
	Th 228	- 3.85e-03	3.7e-02	3.4e-01	PCI/L	19VIII96 07I97
	Th 230	1.89-e-02	2.6e-02	3.2e-01	PCI/L	19VIII96 07I97
	Th 232	3.75e-02	2.4e-02	2.6e-02	PCI/L	19VIII96 07I97
	U 234	3.78e-02	2.4e-02	3.1e-02	PCI/L	19VIII96 07I97
	U 235	2.65e-03	2.8e-02	2.4e-02	PCI/L	19VIII96 07I97
	U 238	3.92e-02	1.5e-02	3.7e-02	PCI/L	19VIII96 07I97
	Ba 140	ND		5.2e+03	PCI/L	19VIII96 07I97
	Co 60	ND		1.8e+01	PCI/L	19VIII96 07I97
	Cs 167	ND		1.3e+01	PCI/L	19VIII96 07I97
	I 161	ND		1.9e+04	PCI/L	19VIII96 07I97
	K 40	ND		1.5e+02	PCI/L	19VIII96 07I97
	Ra 226	ND		2.6e+02	PCI/L	16VIII96 07I97
	Ra 228	ND		4.0e+01	PCI/L	16VIII96 07I97

Sandia Canyon - Site 3

Matrix: water

13 August 1996

	Activity	$\pm 2\sigma$ Uncertainty	Detection Limit	Unit	Date	
					collected	analyzed
Gross Alpha	2.64e+00	2.4e+01	5.2e+00	PCI/L	13VIII96	07I97
Gross Beta	-1.81e+01	2.9e+01	6.1e+01	PCI/L	13VIII96	07I97
Th 227	1.65e-02	3.1e-02	3.9e-01	PCI/L	13VIII96	07I97
Th 228	3.64e-03	2.1e-02	3.2e-01	PCI/L	13VIII96	07I97
Th 230	1.84e-02	2.5e-02	2.9e-01	PCI/L	13VIII96	07I97
Th 232	2.61e-02	3.2e-02	2.9e-02	PCI/L	13VIII96	07I97
U 234	3.72e-02	2.9e-02	3.4e-02	PCI/L	13VIII96	07I97
U 235	2.62e-03	2.5e-02	2.2e-02	PCI/L	13VIII96	07I97
U 238	3.76e-02	2.2e-02	3.5e-02	PCI/L	13VIII96	07I97
Ba 140	ND		3.5e+02	PCI/L	13VIII96	07I97
Co 60	ND		7.0e+00	PCI/L	13VIII96	07I97
Cs 137	ND		6.1e+01	PCI/L	13VIII96	07I97
I 131	ND		5.1e+04	PCI/L	13VIII96	07I97
K 40	ND		7.2e+01	PCI/L	13VIII96	07I97
Ra 226	ND		1.2e+02	PCI/L	13VIII96	07I97
Ra 228	ND		2.0e+01	PCI/L	13VIII96	07I97

Sandia Canyon - Site 3

Matrix: water

16 August 1996

	Activity	±2σ Uncertainty	Detection Limit	Unit	Date	
					collected	analyzed
Gross Alpha	3.01e+00	2.4e+01	4.6e+00	PCI/L	16VIII96	07I97
Gross Beta	-4.52e+00	3.2e+01	6.1e+00	PCI/L	16VIII96	07I97
Th 227	4.21e-02	3.3e-02	3.6e-02	PCI/L	16VIII96	07I97
Th 228	-3.24e-03	2.3e-02	4.1e-02	PCI/L	16VIII96	07I97
Th 230	2.62e-02	2.5e-02	3.2e-01	PCI/L	16VIII96	07I97
Th 232	2.54e-02	2.9e-02	2.5e-02	PCI/L	16VIII96	07I97
U 234	3.22e-02	2.2e-02	3.1e-02	PCI/L	16VIII96	07I97
U 235	-1.43e-03	2.1e-02	2.6e-02	PCI/L	16VIII96	07I97
U 238	3.57e-02	2.5e-02	3.8e-02	PCI/L	16VIII96	07I97
Ba 140	ND		4.3e+03	PCI/L	16VIII96	07I97
Co 60	ND		1.0e+01	PCI/L	16VIII96	07I97
Cs 167	ND		1.0e+01	PCI/L	16VIII96	07I97
I 161	ND		8.7e+04	PCI/L	16VIII96	07I97
K 40	ND		1.0e+02	PCI/L	16VIII96	07I97
Ra 226	ND		1.7e+02	PCI/L	16VIII96	07I97
Ra 228	ND		3.5e+01	PCI/L	16VIII96	07I97

Sandia Canyon - Site 3
Matrix: water
19 August 1996

	Activity	$\pm 2\sigma$ Uncertainty	Detection Limit	Unit	Date	
					collected	analyzed
Gross Alpha	2.38e+00	1.9e+01	4.6e+00	PCI/L	19VIII96	07I97
Gross Beta	5.34e+00	4.1e+01	5.6e+00	PCI/L	19VIII96	07I97
Th 227	3.64e-02	3.6e-02	4.2e-01	PCI/L	19VIII96	07I97
Th 228	4.31e-03	2.4e-02	3.6e-01	PCI/L	19VIII96	07I97
Th 230	2.52-e-02	2.6e-02	3.4e-01	PCI/L	19VIII96	07I97
Th 232	3.03e-02	2.4e-02	2.7e-02	PCI/L	19VIII96	07I97
U 234	3.58e-02	1.9e-02	3.1e-02	PCI/L	19VIII96	07I97
U 235	2.13e-03	1.8e-02	2.3e-02	PCI/L	19VIII96	07I97
U 238	2.99e-02	2.4e-02	3.8e-02	PCI/L	19VIII96	07I97
Ba 140	ND		5.7e+03	PCI/L	19VIII96	07I97
Co 60	ND		1.5e+01	PCI/L	19VIII96	07I97
Cs 197	ND		1.4e+01	PCI/L	19VIII96	07I97
I 191	ND		1.1e+04	PCI/L	19VIII96	07I97
K 40	ND		1.4e+02	PCI/L	19VIII96	07I97
Ra 226	ND		2.3e+02	PCI/L	19VIII96	07I97
Ra 228	ND		4.4e+01	PCI/L	19VIII96	07I97

Sandia Canyon - Site 3
Matrix: pore water
21 August 1996

	Activity	$\pm 2\sigma$ Uncertainty	Detection Limit	Unit	Date	
					collected	analyzed
Los Alamos						
1						
Gross Alpha	-4.36e+00	3.2e+01	3.2e+01	PCI/L	21VIII96	08I97
Gross Beta	6.99e+00	4.1e+01	5.7e+00	PCI/L	21VIII96	08I97
Th 227	2.85e-02	3.7e-02	3.5e-02	PCI/L	21VIII96	08I97
Th 228	3.55e-03	2.8e-02	3.5e-02	PCI/L	21VIII96	08I97
Th 230	2.30-e-02	2.4e-02	3.3e-01	PCI/L	21VIII96	08I97
Th 232	2.78e-02	2.4e-02	2.3e-02	PCI/L	21VIII96	08I97
U 234	3.83e-02	2.8e-02	3.1e-02	PCI/L	21VIII96	08I97
U 235	2.42e-03	1.8e-02	2.1e-02	PCI/L	21VIII96	08I97
U 238	3.54e-02	2.5e-02	4.0e-02	PCI/L	21VIII96	08I97
Ba 140	ND		3.0e+02	PCI/L	21VIII96	08I97
Co 60	ND		3.4e+01	PCI/L	21VIII96	08I97
Cs 217	ND		3.6e+01	PCI/L	21VIII96	08I97
I 211	ND		2.5e+04	PCI/L	21VIII96	08I97
K 40	ND		2.4e+02	PCI/L	21VIII96	08I97
Ra 226	ND		2.6e+02	PCI/L	21VIII96	08I97
Ra 228	ND		4.2e+01	PCI/L	21VIII96	08I97

Pajarito Canyon - Site 4
Matrix: water
13 August 1996

	Activity	$\pm 2\sigma$ Uncertainty	Detection Limit	Unit	Date	
					collected	analyzed
Gross Alpha	3.51e+00	3.2e+01	4.2e+00	PCI/L	13VIII96	07I97
Gross Beta	7.75e+00	4.2e+01	5.2e+01	PCI/L	13VIII96	07I97
Th 227	3.62e-02	3.5e-02	4.1e-01	PCI/L	13VIII96	07I97
Th 228	4.33e-03	2.4e-02	3.2e-01	PCI/L	13VIII96	07I97
Th 230	- 1.92-e-02	1.9e-02	3.1e-01	PCI/L	13VIII96	07I97
Th 232	2.85e-02	2.5e-02	2.7e-02	PCI/L	13VIII96	07I97
U 234	3.55e-02	2.8e-02	3.3e-02	PCI/L	13VIII96	07I97
U 235	2.52e-03	2.4e-02	2.2e-02	PCI/L	13VIII96	07I97
U 238	3.23e-02	2.5e-02	3.8e-02	PCI/L	13VIII96	07I97
Ba 140	ND		4.0e+03	PCI/L	13VIII96	07I97
Co 60	ND		2.9e+01	PCI/L	13VIII96	07I97
Cs 137	ND		1.6e+01	PCI/L	13VIII96	07I97
I 131	ND		1.2e+04	PCI/L	13VIII96	07I97
K 40	ND		2.1e+02	PCI/L	13VIII96	07I97
Ra 226	ND		2.2e+02	PCI/L	13VIII96	07I97
Ra 228	ND		5.6e+01	PCI/L	13VIII96	07I97

Pajarito Canyon - Site 4

Matrix: water

16 August 1996

	Activity	$\pm 2\sigma$ Uncertainty	Detection Limit	Unit	Date	
					collected	analyzed
	Gross Alpha	6.73e+00	3.1e+01	5.4e+00	PCI/L	16VIII96 07I97
	Gross Beta	8.23e+00	2.6e+01	7.2e+01	PCI/L	16VIII96 07I97
	Th 227	1.76e-02	3.2e-02	3.6e-01	PCI/L	16VIII96 07I97
	Th 228	4.62e-03	2.8e-02	2.9e-01	PCI/L	16VIII96 07I97
	Th 230	2.23e-02	2.5e-02	3.3e-01	PCI/L	16VIII96 07I97
	Th 232	3.15e-02	2.3e-02	2.5e-02	PCI/L	16VIII96 07I97
	U 234	3.58e-02	2.4e-02	3.1e-02	PCI/L	16VIII96 07I97
	U 235	2.36e-03	2.4e-02	2.2e-02	PCI/L	16VIII96 07I97
	U 238	2.87e-02	2.3e-02	3.5e-02	PCI/L	16VIII96 07I97
	Ba 140	ND		4.7e+03	PCI/L	16VIII96 07I97
	Co 60	ND		2.1e+01	PCI/L	16VIII96 07I97
	Cs 167	ND		1.9e+01	PCI/L	16VIII96 07I97
	I 161	ND		2.4e+04	PCI/L	16VIII96 07I97
	K 40	ND		2.2e+02	PCI/L	16VIII96 07I97
	Ra 226	ND		2.4e+02	PCI/L	16VIII96 07I97
	Ra 228	ND		4.5e+01	PCI/L	16VIII96 07I97

Pajarito Canyon - Site 4

Matrix: water

19 August 1996

	Activity	±2σ Uncertainty	Detection Limit	Unit	Date	
					collected	analyzed
Gross Alpha	4.32e+00	2.3e+01	4.9e+01	PCI/L	19VIII96	07I97
Gross Beta	5.67e+00	4.2e+01	6.4e+01	PCI/L	19VIII96	07I97
Th 227	2.66e-02	3.1e-02	3.4e-01	PCI/L	19VIII96	07I97
Th 228	3.72e-03	2.8e-02	3.4e-01	PCI/L	19VIII96	07I97
Th 230	2.59-e-02	2.4e-02	3.5e-01	PCI/L	19VIII96	07I97
Th 232	2.62e-02	2.4e-02	2.7e-02	PCI/L	19VIII96	07I97
U 234	4.00e-02	2.5e-02	3.3e-02	PCI/L	19VIII96	07I97
U 235	1.59e-03	1.9e-02	2.4e-02	PCI/L	19VIII96	07I97
U 238	3.62e-02	2.4e-02	4.0e-02	PCI/L	19VIII96	07I97
Ba 140	ND		5.2+03	PCI/L	19VIII96	07I97
Co 60	ND		1.9e+01	PCI/L	19VIII96	07I97
Cs 197	ND		1.7e+01	PCI/L	19VIII96	07I97
I 191	ND		1.7e+04	PCI/L	19VIII96	07I97
K 40	ND		1.3e+02	PCI/L	19VIII96	07I97
Ra 226	ND		2.7e+02	PCI/L	19VIII96	07I97
Ra 228	ND		4.0e+01	PCI/L	19VIII96	07I97

Pajarito Canyon - Site 4
Matrix: pore water
21 August 1996

	Activity	$\pm 2\sigma$ Uncertainty	Detection Limit	Unit	Date	
					collected	analyzed
Gross Alpha	8.76e+00	3.0e+01	5.2e+01	PCI/L	21VIII96	08I97
Gross Beta	7.53e+00	4.1e+01	7.1e+01	PCI/L	21VIII96	08I97
Th 227	2.74e-02	3.8e-02	3.8e-01	PCI/L	21VIII96	08I97
Th 228	4.64e-03	2.8e-02	3.5e-01	PCI/L	21VIII96	08I97
Th 230	1.96-e-02	2.4e-02	2.7e-01	PCI/L	21VIII96	08I97
Th 232	2.85e-02	2.7e-02	2.6e-02	PCI/L	21VIII96	08I97
U 234	3.76e-02	2.5e-02	3.3e-02	PCI/L	21VIII96	08I97
U 235	2.53e-03	2.0e-02	2.7e-02	PCI/L	21VIII96	08I97
U 238	3.14e-02	2.6e-02	3.9e-02	PCI/L	21VIII96	08I97
Ba 140	ND		5.3e+03	PCI/L	21VIII96	08I97
Co 60	ND		2.0e+01	PCI/L	21VIII96	08I97
Cs 217	ND		1.5e+01	PCI/L	21VIII96	08I97
I 211	ND		1.8e+04	PCI/L	21VIII96	08I97
K 40	ND		1.7e+02	PCI/L	21VIII96	08I97
Ra 226	ND		2.3e+02	PCI/L	21VIII96	08I97
Ra 228	ND		3.9e+01	PCI/L	21VIII96	08I97

Canon de Valle - Site 5
Matrix: water
13 August 1996

	Activity	$\pm 2\sigma$ Uncertainty	Detection Limit	Unit	Date	
					collected	analyzed
Gross Alpha	8.32e+00	3.4e+01	6.4e+01	PCI/L	13VIII96	07I97
Gross Beta	-6.51e+00	5.3e+01	4.5e+01	PCI/L	13VIII96	07I97
Th 227	- 2.55e-02	3.6e-02	3.5e-01	PCI/L	13VIII96	07I97
Th 228	2.64e-03	2.9e-02	3.5e-01	PCI/L	13VIII96	07I97
Th 230	2.59-e-02	2.3e-02	3.6e-01	PCI/L	13VIII96	07I97
Th 232	2.12e-02	2.5e-02	2.4e-02	PCI/L	13VIII96	07I97
U 234	3.84e-02	2.4e-02	3.6e-02	PCI/L	13VIII96	07I97
U 235	2.00e-03	3.0e-02	1.9e-02	PCI/L	13VIII96	07I97
U 238	3.23e-02	2.8e-02	4.3e-02	PCI/L	13VIII96	07I97
Ba 140	ND		6.2e+01	PCI/L	13VIII96	07I97
Co 60	ND		2.0e+01	PCI/L	13VIII96	07I97
Cs 137	ND		2.3e+01	PCI/L	13VIII96	07I97
I 131	ND		1.4e+04	PCI/L	13VIII96	07I97
K 40	ND		1.3e+02	PCI/L	13VIII96	07I97
Ra 226	ND		2.5e+02	PCI/L	13VIII96	07I97
Ra 228	ND		4.2e+01	PCI/L	13VIII96	07I97

Canon de Valle - Site 5

Matrix: water

16 August 1996

	Activity	$\pm 2\sigma$ Uncertainty	Detection Limit	Unit	Date	
					collected	analyzed
Gross Alpha	-6.21e+00	3.4e+01	5.6e+01	PCI/L	16VIII96	07I97
Gross Beta	8.2e+00	3.1e+01	6.4e+01	PCI/L	16VIII96	07I97
Th 227	2.55e-02	3.8e-02	4.3e-01	PCI/L	16VIII96	07I97
Th 228	- 3.54e-03	3.1e-02	3.5e-01	PCI/L	16VIII96	07I97
Th 230	2.44-e-02	2.3e-02	3.6e-01	PCI/L	16VIII96	07I97
Th 232	3.15e-02	2.7e-02	2.4e-02	PCI/L	16VIII96	07I97
U 234	3.31e-02	2.5e-02	3.7e-02	PCI/L	16VIII96	07I97
U 235	2.36e-03	2.1e-02	2.4e-02	PCI/L	16VIII96	07I97
U 238	2.96e-02	2.6e-02	3.7e-02	PCI/L	16VIII96	07I97
Ba 140	ND		6.2e+03	PCI/L	16VIII96	07I97
Co 60	ND		1.9e+01	PCI/L	16VIII96	07I97
Cs 167	ND		1.5e+01	PCI/L	16VIII96	07I97
I 161	ND		1.7e+04	PCI/L	16VIII96	07I97
K 40	ND		1.5e+02	PCI/L	16VIII96	07I97
Ra 226	ND		2.2e+02	PCI/L	16VIII96	07I97
Ra 228	ND		5.0e+01	PCI/L	16VIII96	07I97

Canon de Valle - Site 5
Matrix: water
19 August 1996

	Activity	$\pm 2\sigma$ Uncertainty	Detection Limit	Unit	Date	
					collected	analyzed
Gross Alpha	2.69e+00	2.3e+01	4.3e+01	PCI/L	19VIII99	07I97
Gross Beta	-2.18e+00	3.6e+01	6.4e+01	PCI/L	19VIII99	07I97
Th 227	1.92e-02	2.1e-02	3.4e-01	PCI/L	19VIII99	07I97
Th 228	3.65e-03	2.4e-02	3.6e-01	PCI/L	19VIII99	07I97
Th 230	2.65e-02	2.2e-02	3.4e-01	PCI/L	19VIII99	07I97
Th 232	-2.25e-02	2.5e-02	2.3e-02	PCI/L	19VIII99	07I97
U 234	3.00e-02	2.5e-02	3.3e-02	PCI/L	19VIII99	07I97
U 235	1.78e-03	1.2e-02	2.7e-02	PCI/L	19VIII99	07I97
U 238	3.63e-02	2.5e-02	3.5e-02	PCI/L	19VIII99	07I97
Ba 140	ND		6.0e+03	PCI/L	19VIII99	07I97
Co 90	ND		2.1e+01	PCI/L	19VIII99	07I97
Cs 197	ND		1.9e+01	PCI/L	19VIII99	07I97
I 191	ND		1.1e+04	PCI/L	19VIII99	07I97
K 40	ND		1.9e+02	PCI/L	19VIII99	07I97
Ra 229	ND		2.2e+02	PCI/L	19VIII99	07I97
Ra 228	ND		4.5e+01	PCI/L	19VIII99	07I97

Canon de Valle - Site 5
Matrix: pore water
21 August 1996

	Activity	$\pm 2\sigma$ Uncertainty	Detection Limit	Unit	Date	
					collected	analyzed
Gross Alpha	9.12e+00	3.5e+01	5.5e+01	PCI/L	21VIII96	08I97
Gross Beta	2.23e+00	3.7e+01	6.7e+01	PCI/L	21VIII96	08I97
Th 227	2.73e-02	3.4e-02	3.4e-01	PCI/L	21VIII96	08I97
Th 228	3.62e-03	2.8e-02	3.3e-01	PCI/L	21VIII96	08I97
Th 230	2.69-e-02	2.4e-02	3.5e-01	PCI/L	21VIII96	08I97
Th 232	3.54e-02	2.6e-02	2.9e-02	PCI/L	21VIII96	08I97
U 234	3.82e-02	2.8e-02	3.5e-02	PCI/L	21VIII96	08I97
U 235	3.03e-03	2.2e-02	2.5e-02	PCI/L	21VIII96	08I97
U 238	3.11e-02	2.4e-02	3.7e-02	PCI/L	21VIII96	08I97
Ba 140	ND		5.0e+03	PCI/L	21VIII96	08I97
Co 60	ND		1.4e+01	PCI/L	21VIII96	08I97
Cs 217	ND		1.6e+01	PCI/L	21VIII96	08I97
I 211	ND		2.1e+04	PCI/L	21VIII96	08I97
K 40	ND		2.2e+02	PCI/L	21VIII96	08I97
Ra 226	ND		2.5e+02	PCI/L	21VIII96	08I97
Ra 228	ND		5.0e+01	PCI/L	21VIII96	08I97